ANNUAL REPORT 1964

GEORGETOWN

water pollution control plant

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Georgetown Local Advisory Committee,
Town of Georgetown.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Georgetown Water Pollution Control Plant, OWRC Projects Nos. 58-S-17 and 61-S-77.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Georgetown Water Pollution Control Plant, OWRC Projects Nos. 58-S-17 and 61-S-77 for 1964.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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GEORGETOWN

water pollution control plant

operated for

THE TOWN OF GEORGETOWN

by the

ONTARIO WATER RESOURCES COMMISSION

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DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: B. G. Porter

801 Bay Street Toronto 5

'64 REVIEW

The following report gives in detail significant data on the operation of the various treatment units at the Georgetown Water Pollution Control Plant.

With an average daily flow of 0.84 MGD, the plant is well below its full treatment capacity of 1.5 MGD. It is expected that 1964 will be the lowest flow year due to an expected increase during 1965.

The annual operating costs have continued to increase over 1963 due to increased costs of labour, supplies and to increased maintenance. The cost per million gallons treated and per lbs. of BOD removed have been further increased due to a reduction in flow and loading. The cost of $96.82 per million gallons is still lower than many comparable operations.

Under the constant supervision of OWRC head office engineers, the plant staff has maintained a clean, attractive and efficient plant for the Town of Georgetown. A special emphasis is always placed on public relations and aesthetic qualities of the plant. Visitors are always welcome during week days.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1957 - 1964

INCEPTION

On July 31, 1957, the Town of Georgetown, in cooperation with the Ontario Water Resources Commission, initiated plans for the construction of a modern water pollution control plant. The firm of Proctor & Redfern, Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

Ontario Municipal Board approval for this project was granted on July 15, 1958 and on August 6th, 1958, the town signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the project.

CONSTRUCTION

The contract was awarded to Frid Construction Company of Hamilton, Ontario who began work in April, 1959. Construction was substantially completed in April 1961. Full scale operation was commenced in June of 1961.

ADDITIONS

In March, 1961, a municipal agreement was reached for the completion of construction of a sewage pumping station and forcemain to serve the east Georgetown industrial area. The firm of Proctor and Redfern, Consulting Engineers, was engaged to prepare plans and specifications.

On February 6, 1962, the town signed a final agreement with the Ontario Water Resources Commission to finance, construct and operate the project. The construction contract was awarded to A. J. McCarthy Construction.

TOTAL COST

58-S-17	$823,298.00
61-S-77	$ 44,158.00

F. W. SMITH
CHIEF OPERATOR

Project Staff

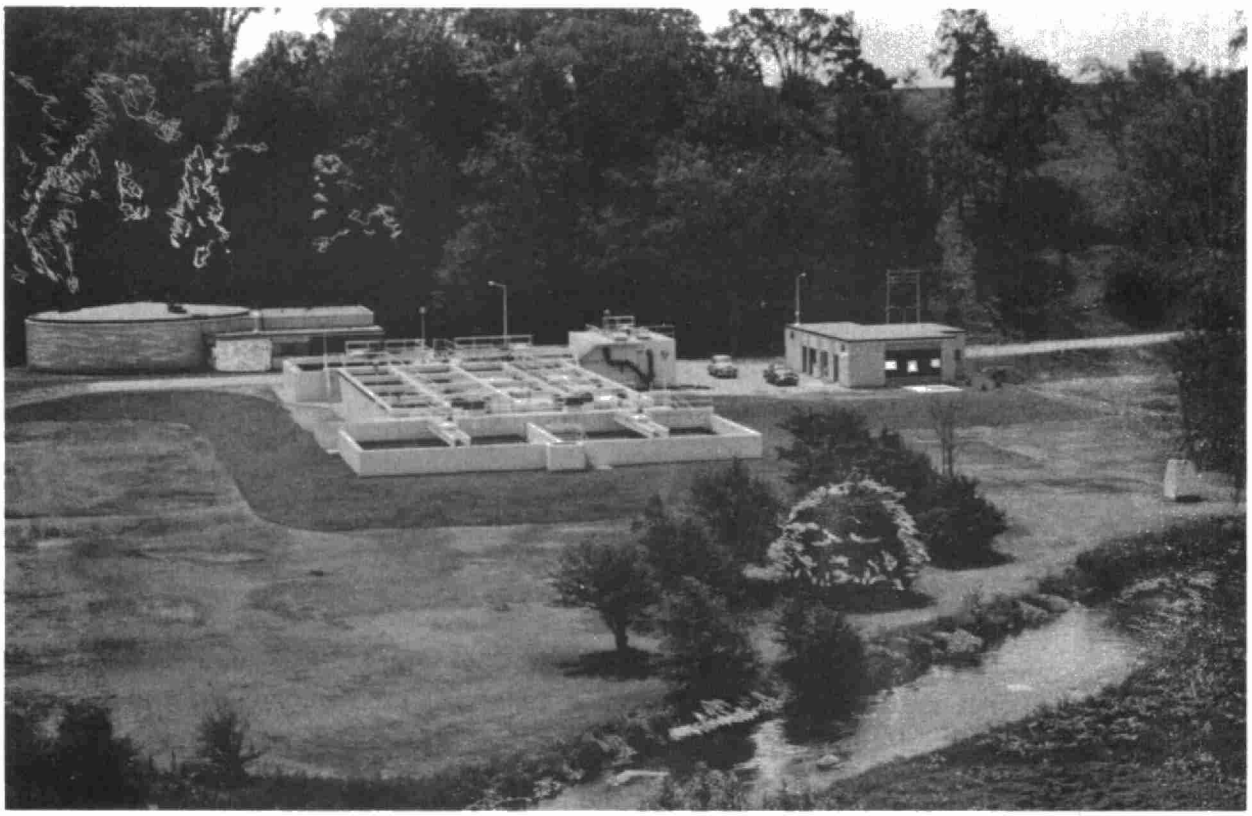
Operators: R. A. Rolfe
K. J. Lee

COMMENTS

The normal complement of staff consists of one Chief Operator and two operators. An operator was hired in June 1964 to fill the vacancy created by the resignation of a previous operator.

During the week, Monday to Friday, the plant is staffed eight hours per day. Staff rotation provides four hours coverage per day on Saturday and Sunday.

Mr. Smith received his Certificate of Qualification as a water Pollution control operator in 1964 after successfully completing a series of three one week duration courses of instruction sponsored by the OWRC. Mr. Rolfe will complete the series of courses in 1965.



Description of Project

INFLUENT WORKS

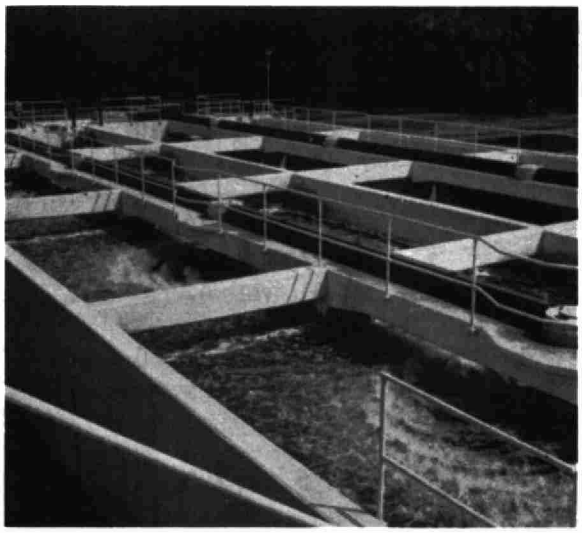
Sewage enters the plant through a trunk sewer and then passes through a Chicago Pump Company barminutor which cuts and shreds the larger solids in the sewage. A coarse bar screen may be used as a barminutor bypass. Flow from the barminutor is received by the raw sewage pump wet well.

Two Flomatcher controlled variable speed 50 hp sewage pumps lift the sewage to an elevated flowmeter. Flow measurements are continuously recorded from signals originating from the sewage passing through a 12 inch throat Parshall flume. The flow next enters the grit removal facilities.

Grit is removed by a Dorr-type W. A. detritor. The 12 foot square, flow through tank is equipped with a raking mechanism to remove the settled grit. The grit is automatically washed before disposal on the plant site.

PRIMARY CLARIFIERS

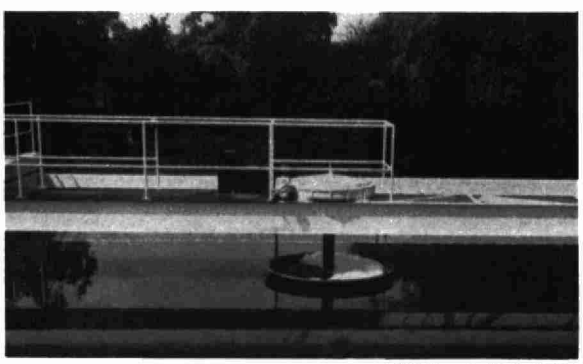
Two 35 ft. square x 10 ft. side wall depth concrete primary clarifier tanks receive gravity flow from the detritor. The tanks are equipped with a circular scraping mechanism to remove the sludge which settles to the bottom and a skimmer arm to remove the grease and floating solids. Sludge and scum are pumped to the primary digester. The retention time in the primary clarifiers, at design flow of 1. 5 MGD, is 2. 5 hours.



AERATION TANKS

AERATION

Primary effluent is mixed with return activated sludge and aerated in two 28 ft. x 112 ft. x 13.25 ft. deep, four cell mechanical aeration tanks. Air is supplied by eight Ames Crosta Simplex high intensity mechanical aerators. Oxygen transfer can be regulated by adjusting variable level effluent weirs. Adsorption and aerobic digestion of suspended and dissolved organic solids occurs due to the action of bacteria and enzymes in the mixed liquor. Aeration retention time is approximately 7.5 hours at design flow.



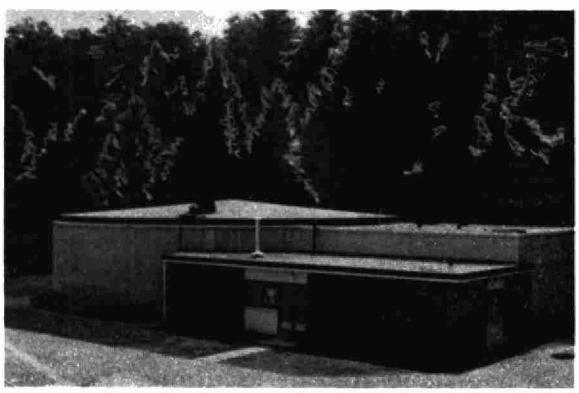
FINAL CLARIFIERS

FINAL CLARIFIERS

Two 40 ft. square by 10 ft. SWD concrete clarifiers receive gravity flow from the aeration section. Activated sludge settles to the tank bottom where it is collected by a circular scraping mechanism. A portion of this sludge is returned to the aeration section and the remainder is wasted to the primary clarifiers. The clear liquid remaining in the clarifiers overflows a peripheral weir and is directed to the chlorine contact chamber.

CHLORINE CONTACT CHAMBER

The concrete chamber is located close to the Silver Creek. It measures 24 ft. x 15 ft. x 6 ft. deep and provides a retention time of 26 minutes at design flow. Chlorine is fed to this tank by a 150 pound per day capacity gas chlorinator located in the control building. The contact chamber is close coupled to a spillway outfall structure. The effluent is then directed to Silver Creek.



DIGESTION BUILDING

DIGESTION TANKS

A 66 ft. diameter primary digester equipped with three mechanical draft tube mixers receives all of the sludge from the plant. This unit has a capacity of 484,800 gallons. Anaerobic digestion of the sludge occurs converting volatile solids into water and methane gas. The gas produced is used to heat the digesters to the optimum digestion temperature.

A 34 ft. square conditioning tank, having 134,000 gallon capacity receives sludge by gravity from the primary digester. This tank is unheated and remains quiescent to allow stratification into a bottom layer of relatively clear supernatant.

PROJECT COSTS

LONG TERM DEBT:	58-S-17		$823,298.00
(Total Capital Cost)	61-S-77		44,158.00
			$867,456.00

The total cost to the municipality during 1964 was as follows:

Net Operating			$ 29,738.15
Debt Retirement	- S-17	$21,149.36	
	S-77	2,080.60	
			$ 23,229.96
Reserve	- S-17	$ 6,876.00	
	S-77	463,00	
			$ 7,339.00
Interest Charged	- S-17	$48,735.92	
	S-77	2,483.82	
			$ 51,219.74
	TOTAL		$111,526.85

RESERVE ACCOUNT

Balance at Jan. 1, 1964	- S-17	$18,785.06	
	S-77	676,68	
			$ 19,461.74
Deposited by Municipality			$ 7,339.00
Interest Earned	- S-17	$ 1,165.80	
	S-77	47.34	
			$ 1,213.14
			$ 28,013.88
Less Expenditures	S-17		364,21
Balance at Dec. 31, 1965			$ 27,649.67

DEBT OUTSTANDING:	S-17	$750,497.40

MONTHLY COSTS
(both projects)

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	*SUNDRY
JAN	2528.08	1058.96		172.85	292.70	523.58	31.21	57.16	201.42	190.20
FEB	1604.96	1058.96		161.16			139.43		183.24	62.17
MARCH	2036.73	1058.96		275.66	290.54	(350.00)	109.03	14.16	164.67	473.71
APRIL	1462.53	1101.10		53.30	274.25	(125.97)	108.72		29.18	21.95
MAY	2896.91	1095.48		100.67	311.86		42.93		359.72	986.25
JUNE	2229.91	955.07	182.66		279.02	580.43	47.80			184.93
JULY	2682.52	1045.60	184.09		288.80		174.77	49.38	180.99	758.89
AUG	1693.08	1045.60	140.04		282.08		74.34	5.09	110.21	35.72
SEPT	3252.30	1045.60			329.23	285.77	91.15		121.06	1379.49
OCT	2834.31	1045.60		105.61	260.33	46.14	157.62	479.52	87.22	652.27
NOV	2268.21	1045.60	8.72		290.37		193.99	69.09	9.74	650.70
DEC	4248.61	1576.96		252.26	585.54	(27.92)	313.39	824.03	629.92	94.43
TOTAL	+29738.15	13133.49	515.51	1121.51	3484.72	932.03	1484.38	1498.43	2077.37	5490.71

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $3,675.60

BRACKETS INDICATE CREDIT

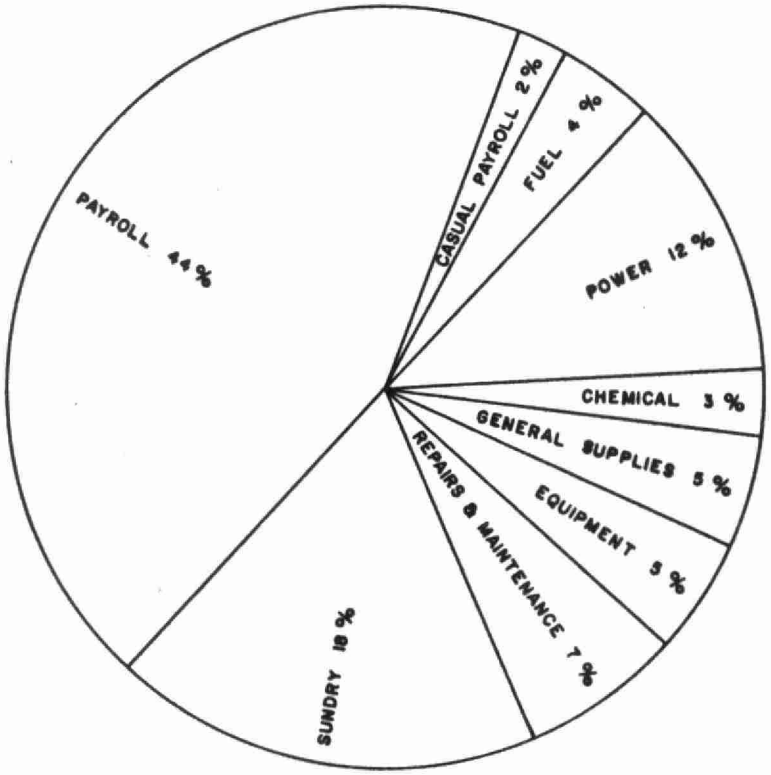
+ DOES NOT INCLUDE $4.90 LIABILITY INSURANCE (61-S-77)

YEARLY COSTS

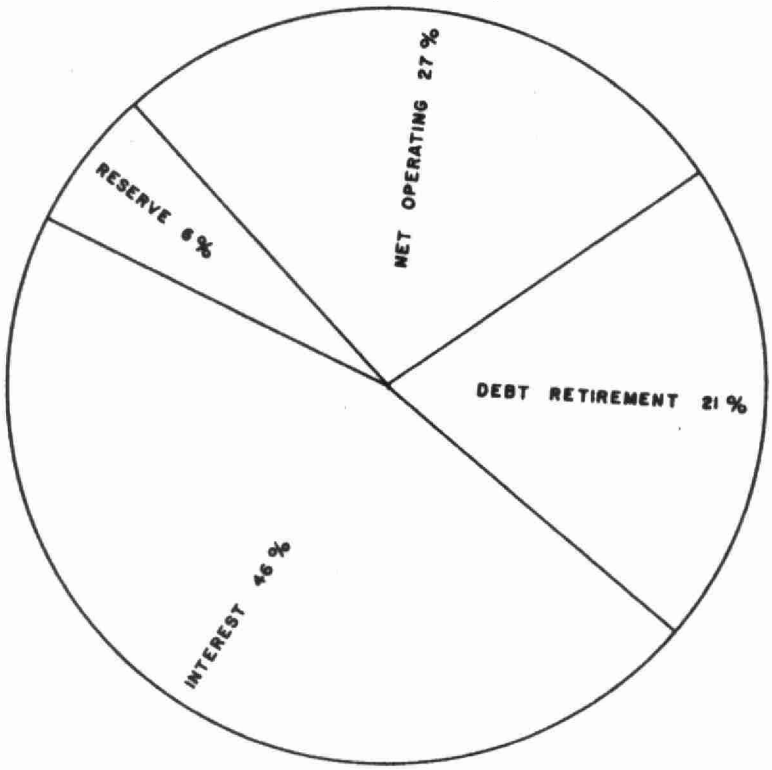
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	351.410	22842.71	*8.35	65.00	6 CENTS
1963	325.551	26694.78	9.71	81.63	8 CENTS
1964	307.116	29738.15	10.37	96.82	10 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1964 OPERATING COSTS



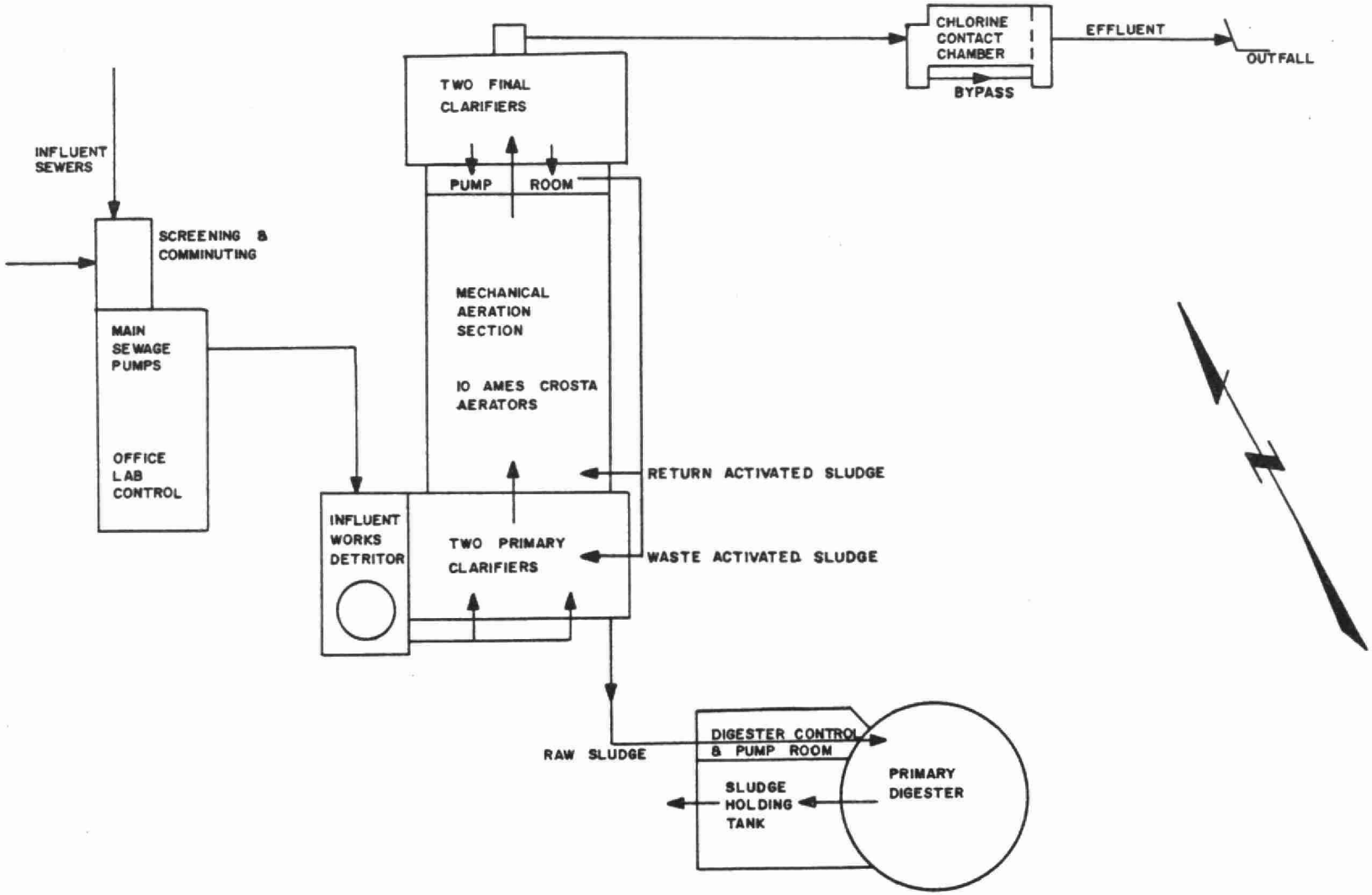
TOTAL ANNUAL COST
(BOTH PROJECTS)



Technical Section

GEORGETOWN S.T.P.

FLOW DIAGRAM



Design–Data

GENERAL

Type of Plant - Activated sludge

Design Population - 15,000 persons

Design Plant Flow - 1.5 mgd

Per Capita Flow - 100 gallons per day.

Five Day BOD -

Raw Sewage - 200 ppm

Removal - 95%

Suspended Solids -

Raw Sewage - 200 ppm

Removal - 95%

PRIMARY TREATMENT

Screening

Coarse bar screens at 3/4 inch spacings.

Comminution

Chicago Pump Company 24 inch, Model C Barminutor.

Sewage Lift Pumps

Two Chicago pumps each capable of 3500 USGPM at 60 ft. discharge head.

Flowmeter

12 inch Parshall flume.

Grit Removal

12 ft. square Dorr Type WA detritor.
Removal - 95% of +65 mesh grit.

Primary Clarifiers

Dorr Type A
Number of Tanks - Two
35 ft. square x 10 ft. side wall depth
Total volume - 24,500 cu. ft. or 153,000 gallons.
Retention - 2.5 hours at design flow.

BOD Reduction - 30%

Surface Settling Rate - 612 Imperial gallons per sq. ft. per day.

Weir Rate - 5,360 Imperial gallons per ft. of weir per day.

SECONDARY TREATMENT

Aeration Section

Ames Crosta Ltd. Simplex mechanical aeration - 8 units.

Number of Tanks - Two

Size of tanks - 28 ft. x 112 ft. x 13.25 ft.
Total volume - 0.495 MG or 79,420 cu. ft.
Retention - 7.91 hours.

Final Sedimentation Tanks

Two Dorr Type AZ square tanks.
Size - 40 ft. x 40 ft. x 10 ft. side wall depth.
Volume - 100,000 gallons each or 16,000 cu. ft. each.

Retention - 3.2 hours.

Surface Settling Rate - 470 gallons per ft. per day.

Weir rate - 4,700 gallons per ft. per day.

Chlorine Contact Chamber

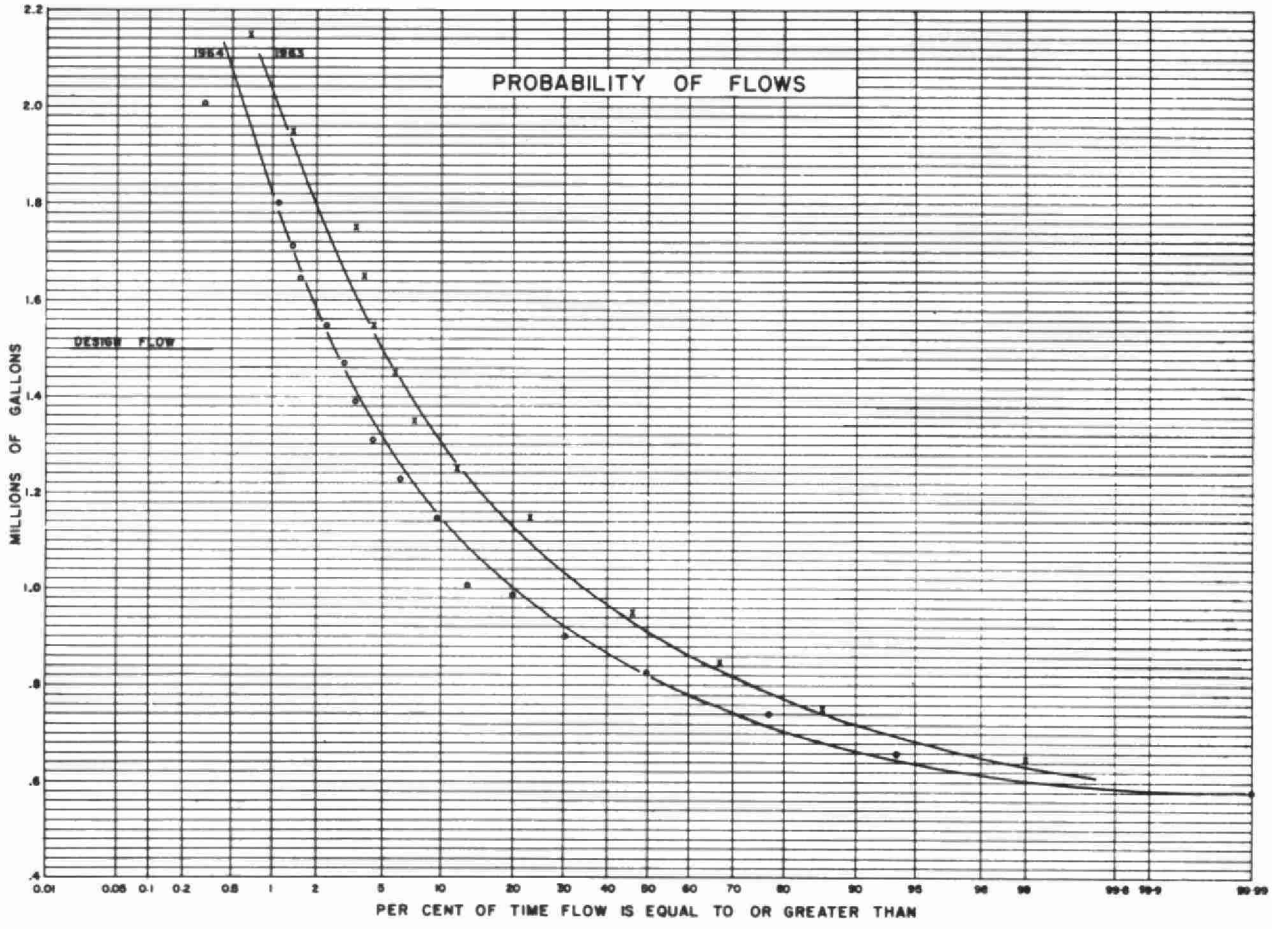
Size - 45 ft. x 15 ft. x 6 ft. deep.
Volume - 27,000 gallons
Retention - 26 minutes

DIGESTION TANKS

Primary - 66 ft. diameter
Volume - 77,800 cubic feet
Dorr draft tube mixers - 3

Secondary - 34 ft. square x 16.25 ft.
Volume - 20,700 cubic feet

Sludge Disposal
Liquid sludge removal by tank truck.

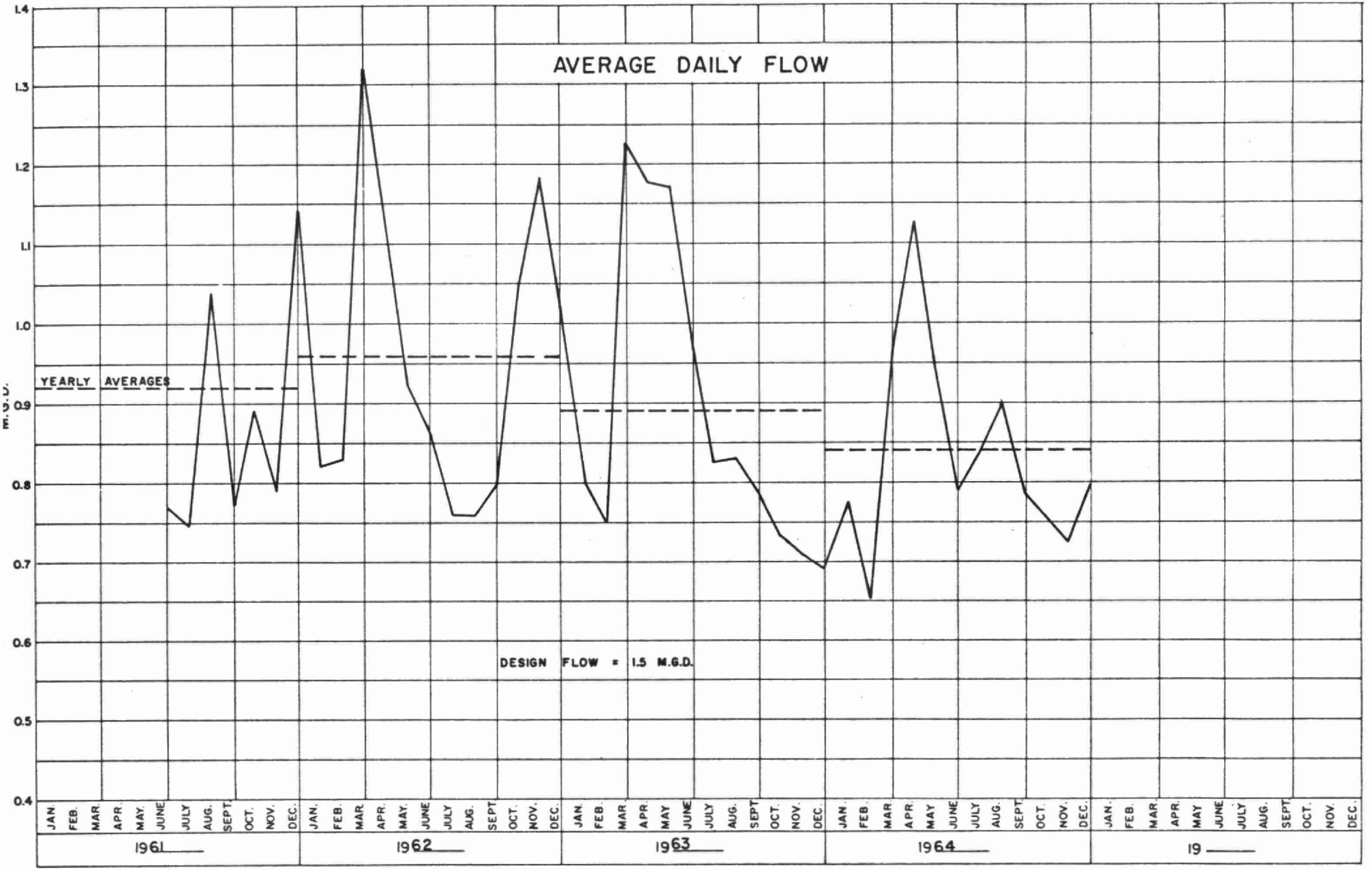


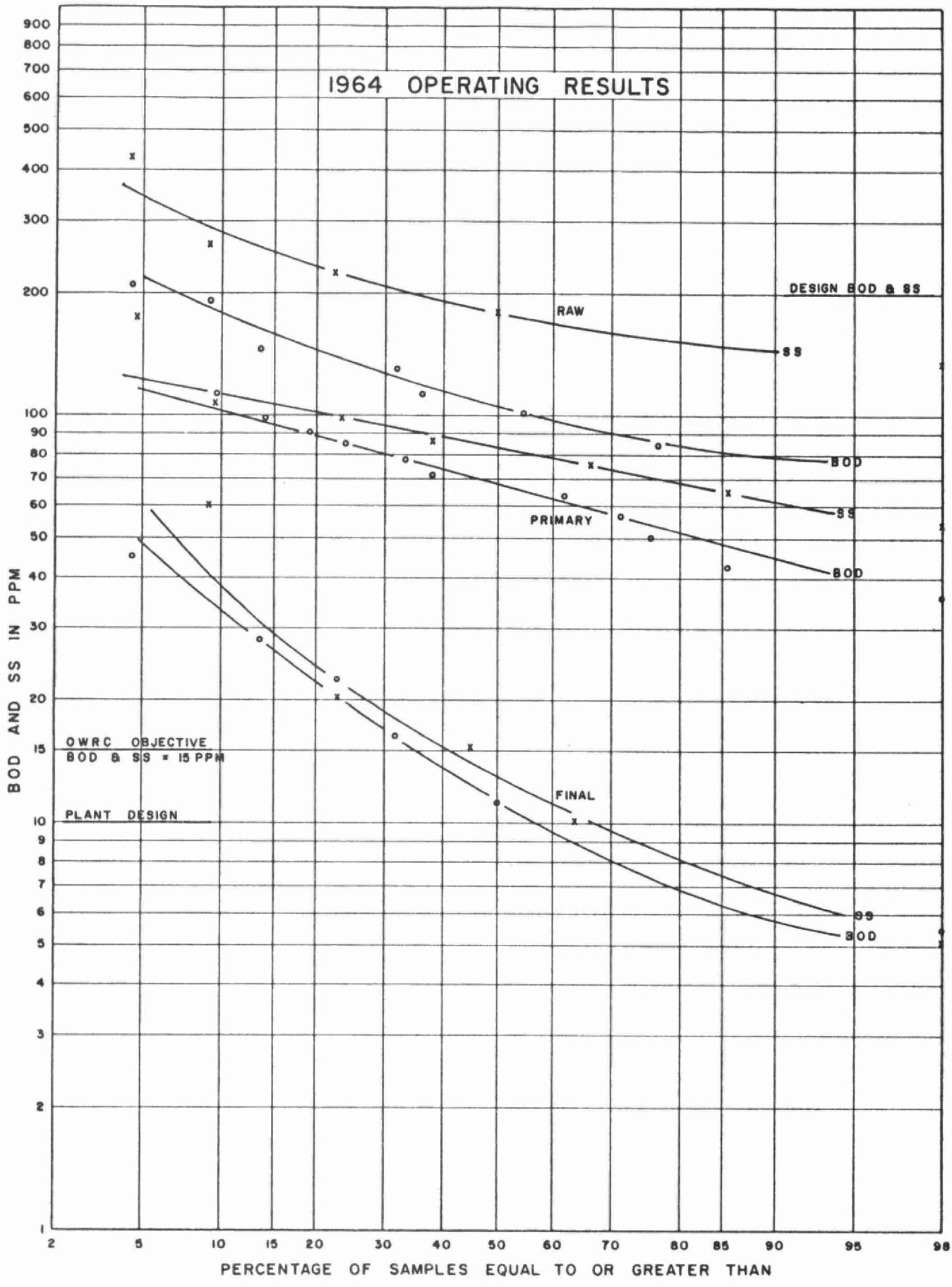
Process Data

During 1964, the average daily flow and total flow for the year were slightly less than the 1963 flows. The average daily flow was 0. 84 million gallons compared to 0. 89 million gallons per day in 1963, for a decrease of 5. 6%. 307 million gallons of raw sewage, a combination of both industrial and domestic wastes, received complete treatment.

The maximum 24 hour flow was 2. 072 million gallons with maximum and minimum flow rates of 4. 15 and 0. 10 million gallons per day.

The following graphs and charts outline the quality and quantities of flow received at the Georgetown plant. The flow probability graph indicates that sudden large increases in flow can be expected for short durations during periods of higher than design flow. During 1963, the flow exceeded design about 5% of the time. In 1964, this has been reduced to about 2 1/2% of the time.


AVERAGE DAILY FLOW
m.g.d.
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
YEARLY AVERAGES
DESIGN FLOW = 1.5 M.G.D.
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1961
1962
1963
1964
19


1964 OPERATING RESULTS
DESIGN BOD & SS
RAW
SS
BOD
PRIMARY
SS
BOD
FINAL
SS
BOD
OWRC OBJECTIVE
BOD & SS = 15 PPM
PLANT DESIGN
BOD AND SS IN PPM
PERCENTAGE OF SAMPLES EQUAL TO OR GREATER THAN
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
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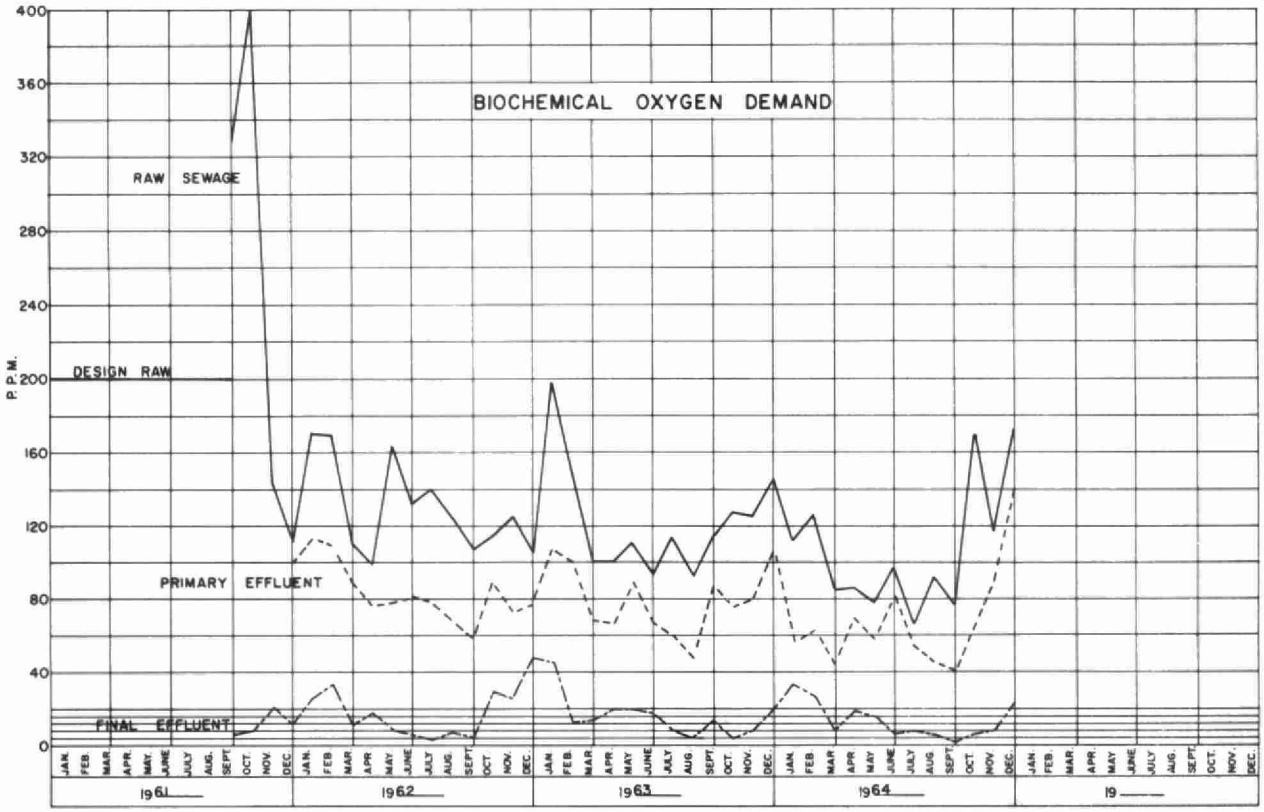
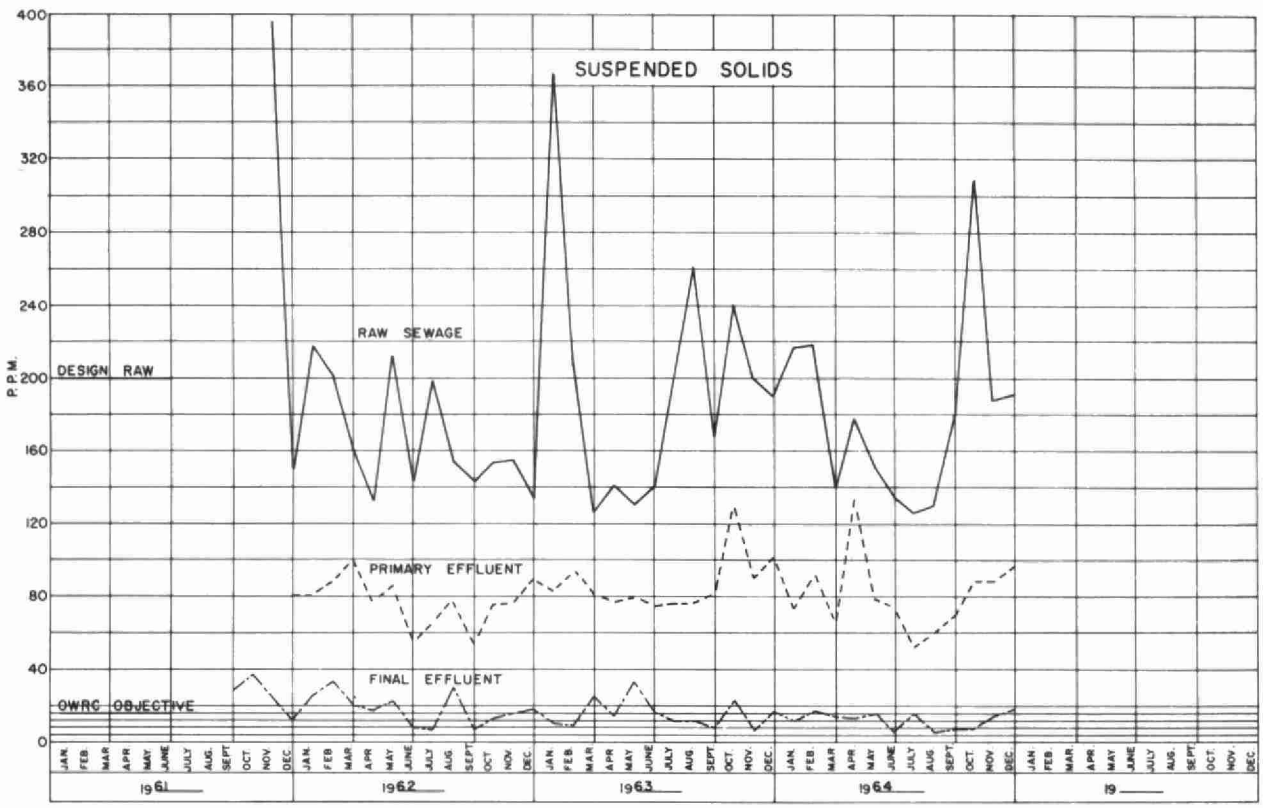
30
40
50
60
70
80
85
90
95
98



MONTHLY VARIATIONS

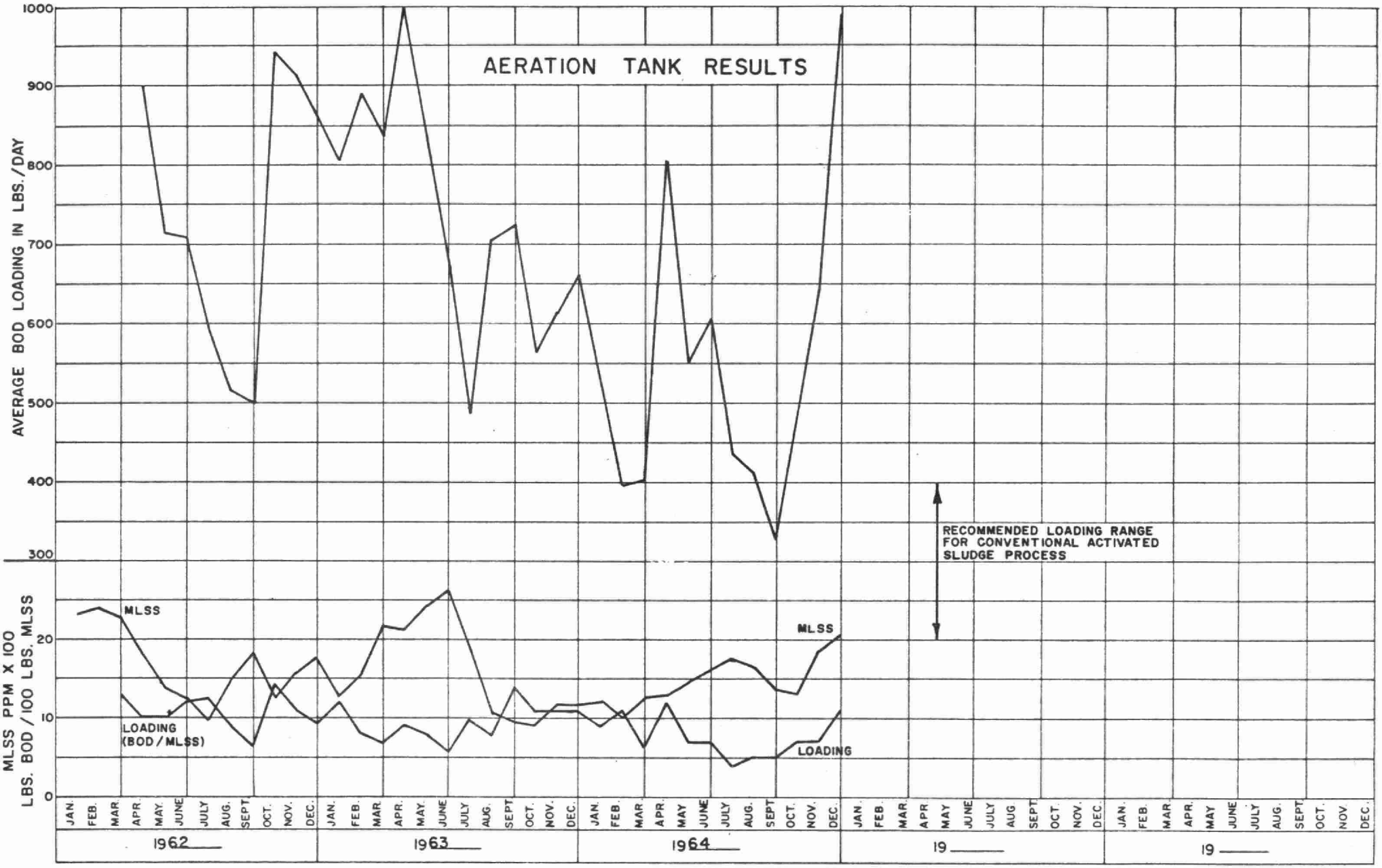


GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	112	34	69.5	9.4	216	12	94.5	24.5	33
FEB.	126	28	77.5	9.3	218	17	92	19	24
MAR.	84	8	90.5	11.3	140	15	89	18.5	23
APR.	85	19	77.5	11.1	179	14	92	27.8	33
MAY	79	16	79.5	9.2	153	16	89.5	20	34
JUNE	97	7.6	92	10.8	135	6	95.5	15.6	43
JULY	66	8	87.5	7.5	126	16	87.5	14.3	26
AUG.	92	6.1	93.5	12.0	129	6	95.5	17.2	28
SEPT.	76	2.7	96.5	8.6	178	7	96.0	20.2	34
OCT.	170	6.4	96.0	19.1	308	8	97.5	35.1	39
NOV.	117	8.0	93.0	11.4	188	15	92.0	18.8	43.9
DEC.	171	23	86.5	18.3	192	18	90.5	21.5	57
TOTAL	–	–	–	141.3	–	–	–	258.0	418
AVG.	106	14	86.5	11.8	180	12	93.5	21.5	35

COMMENTS

The average BOD and suspended solids loadings in the raw sewage were less than the plant design loadings. There was also a slight decrease from 1963 in both BOD and suspended solids. The effluent contained an average BOD of 14 ppm for an average reduction of 86.5% and a suspended solids of 12 ppm for an average reduction of 93.5%. These final effluent values meet the OWRC objectives of 15 ppm, but do not meet the design values of 10 ppm. It should be noted that it is normally during periods of flows greater than design that the effluent quality does not meet the OWRC objectives. During 1965, attempts will be made to improve the effluent quality by adjustments to the plant operation and increased laboratory control.


AERATION TANK RESULTS
AVERAGE BOD LOADING IN LBS./DAY
1000
900
800
700
600
500
400
300
MLSS PPM X 100
LBS. BOD / 100 LBS. MLSS
20
10
0
MLSS
LOADING
(BOD / MLSS)
MLSS
LOADING
RECOMMENDED LOADING RANGE
FOR CONVENTIONAL ACTIVATED
SLUDGE PROCESS
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1962
1963
1964
19
19

AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	56	1192	9	–
FEBRUARY	63	1009	8	–
MARCH	44	1272	6	–
APRIL	70	1302	12	–
MAY	59	1460	7	–
JUNE	82	1618	7	–
JULY	55	1757	4	–
AUGUST	45	1668	5	–
SEPTEMBER	41	1370	5	–
OCTOBER	66	1331	7	–
NOVEMBER	90	1852	7	–
DECEMBER	143	2086	11	–
TOTAL	–	–	–	–
AVERAGE	68	1493	7	–

COMMENTS

The average of 7 lbs. of BOD per 100 lbs. M. L. S. S. is lower than the recommended loading of 20 to 40 lbs. BOD per 100 lbs. M.L.S.S. for aeration sections. It has been thought necessary, however, to maintain this low value to treat the high flows combined with Low BOD loadings. The design BOD loading to the aeration section of 140 ppm is more than double the actual value of 68 ppm.

In 1965, attempts will be made to obtain a more favourable ratio of lbs. of BOD to M.L.S.S.

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU.FT.	% SOLIDS	% VOL. MAT.	1000'S CU.FT.	% SOLIDS	% VOL. MAT	
JAN.	8.43	6.60	4.64	9.72	4.69	2.42	-
FEB.	8.06	6.09	-	4.54	2.11	-	-
MAR.	8.25	-	-	9.45	2.80	1.43	-
APR.	8.02	-	-	8.75	-	-	-
MAY	8.05	-	-	10.37	-	-	-
JUNE	8.80	-	-	11.50	-	-	-
JULY	7.82	-	-	9.55	-	-	-
AUG.	8.31	-	-	8.99	-	-	-
SEPT.	10.30	-	-	15.55	-	-	-
OCT.	10.97	-	-	13.61	-	-	-
NOV.	9.12	-	-	10.53	-	-	-
DEC.	8.62	-	-	12.64	-	-	-
TOTAL	104.75	-	-	125.20	-	-	-
AVG.	8.73	6.34	4.64	10.43	3.20	1.92	-

COMMENTS

During 1964, the records indicate an increase in the amount of sludge hauled since 1963. Problems in obtaining a suitable supernatant contributed to this increase. The values shown on the chart for sludge to the digester are estimated by the running time of the pump only and are not considered accurate. The sludge removed, however, is an accurate measurement by volume to the liquid sludge hauling truck.

The amount of gas produced could not be measured in 1964, however, the installation of a gas meter in 1965 will correct this deficiency.

Laboratory control on percent solids and volatile matter will also give more complete information in 1965.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	24.013	719	2.99
FEBRUARY	18.935	543	2.86
MARCH	29.665	839	2.83
APRIL	33.722	816	2.42
MAY	29.185	903	3.09
JUNE	24.153	837	3.46
JULY	26.021	1064	4.09
AUGUST	28.055	* 701 (24)	3.30
SEPTEMBER	23.576	1059	4.49
OCTOBER	23.391	966	4.13
NOVEMBER	21.709	973	4.48
DECEMBER	24.691	905	3.66
TOTAL	307.116	10325	-
AVERAGE	25.593	860	3.36

* chlorinator under repair 7 days

COMMENTS

Chlorination of the final effluent is now practiced year-round on all OWRC plants on the Credit River watershed, as well as many other watersheds in Ontario. In 1964, 10,325 pounds of chlorine were used at an average rate of 860 lbs. per month or 28.3 lbs. per day. The average dosage rate of 3.36 was sufficient to maintain a chlorine residual of 0.5 ppm.

CONCLUSIONS

The data given in this report serve as a useful reference for all who are concerned with the operation of the Georgetown Water Pollution Control Plant. This data will be especially valuable when the plant requires expansion in the future.

The following changes will be considered in order that the efficiency of the operation will be improved:

1. Alterations to the supernatant selector and the digester storage system.

2. Even control of raw sludge pumpage and return activated sludge wasting to the two primary clarifiers.

3. Provision bypass facilities for chlorine contact chamber.

4. Provision of facilities to drain aeration tanks.


ONTARIO WATER RESOURCES COMMISSION